

## **REMARKS**

Upon careful and complete consideration of the Office Action dated November 20, 2002, applicants have amended the claims which, when considered in conjunction with the comments herein below, are deemed to place the present application into condition for allowance. Favorable reconsideration of this application, as amended, is respectfully solicited.

The Office Action objected to claims 9 and 37 for informalities found therein. The missing punctuation and the spelling error identified by the Examiner have been corrected. Based on these amendments, applicant respectfully requests that the objection to these claims be withdrawn.

Claims 1-43 were then rejected by the Office Action under 35 U.S.C. §112, second paragraph, as allegedly “being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.”

The term “weakly” found in claims 1, 8, 10, 17-19, 28, 29, 36 and 37, and the term “strongly” found in claims 9, 17, 18, 38 and 39, were rejected as allegedly being indefinite terms which rendered these claims indefinite. Similarly, claims 1, 8-10- 17-19, 28, 29, and 36-39 were further rejected for use of the phrase “a weakly acid cationic exchange resin” and/or “a strongly acid cation exchange resin”. The Examiner noted in this last rejection that it “is unclear as what is meant by a weakly or strongly acid cation exchange resin. An acid cation exchange resin can be weak or strong, but it is unclear what is meant by weakly and strongly.”

All of the above-noted claims have been amended by changing the words “weakly” and “strongly” to read “weak” and “strong”, respectively. It is respectfully

submitted that the terms “weak acid cation exchange resin” and “strong acid cation exchange resin” now found in the claims are terms of art and are recognized by the skilled artisan such that they would be reasonably appraised of the scope of the invention. Accordingly, the rejection of these claims are respectfully requested to be withdrawn as well.

Claims 8 and 9 were next rejected by the Office Action for an alleged lack of sufficient antecedent basis regarding the limitation “one column” found in said claims. These claims have been amended to provide the required antecedent basis. Based on said amendments, withdrawal of these rejections are respectfully requested.

Claim 11 was rejected as use of the term “buthyl” was questioned. This claim has been amended to correct the spelling of this word to “butyl”. Additionally, a comma was added between the compounds butyl acrylate and methyl methacrylate. Based on said amendments to claim 11, the rejection of this claim should also be withdrawn. Applicants respectfully request said withdrawal.

Claims 12 and 13 have been amended to identify that it is the cation of the weak cation exchange resin, which is in the form of Na<sup>+</sup>, K<sup>+</sup>, etc. Applicants respectfully believe this clears up the concerns of the Examiner and the rejection of said claims is respectfully requested to be withdrawn.

Claims 20-25 were then rejected by the Office Action for either lacking proper antecedent basis or for being unclear with respect to the use of certain language. All of these claims have been amended to overcome the deficiencies raised by the Office Action and their rejections are respectfully requested to be withdrawn.

Finally, with respect to the §112 rejections, claims 28 and 29 were amended by inserting the proper unit of measures regarding the recited particle sizes, and claims 30 and 31 (the Office Action referred to claims 29 and 30) were amended to provide proper basis for reference to the limitation “feed solution”. The rejection of these claims are respectfully requested to be withdrawn as well based on the amendments made thereto.

Claims 1-43 were then rejected by the Office Action under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,359,430 to Heikkila et al. (hereinafter referred to as “Heikkila et al.”).

As indicated by the Office Action, Heikkila et al. disclose a process of separating betaine from the sugars and non-sugars of beet molasses by a chromatographic process. The column contains a strong cation exchange in alkali form. The claimed invention of the present application concerns a method comprising a multi-step process for recovering one or more products by using chromatographic separation comprising at least one step wherein a weak acid cation exchange resin is used for chromatographic separation. The present invention specifically relates to the use of a weak acid cation exchange resin. It is noted that claim 1 only mentions the use of a weak acid cation exchange resin. The further use of a strong acid cation exchange resin in the method of the present invention is merely one possible embodiment of the invention and is not required.

As pointed out by the Office Action, there is no teaching in Heikkila et al. of the use of a weak acid cation exchange resin. Regardless of this fact, the Office Action has concluded that the use of a weak acid ion exchange column additionally in the

process of Heikkila et al. would have been obvious to the skilled artisan and thus makes the present invention obvious. Applicants respectfully disagree with said conclusion.

In order to fully appreciate the teachings of a reference cited in an unobviousness rejection, that reference must be considered in its entirety. More specifically, the Court of Appeals for the Federal Circuit has stated:

It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art.

Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc., 796 F.2d 443, 449, 230 USPQ 416, 419 (Fed. Cir. 1986), cert. denied, 484 U.S. 823 (1987) (quoting In re Wesslau, 353 F. 2d 238, 241, 147 USPQ 391, 393 (CCPA 1965)).

Heikkila et al. clearly teaches the use of a strong cation exchange resin in its betaine recovery system. The Examiner's attention is respectfully directed to column 2, lines 39-40. There is absolutely no teaching, mention or suggestion of using a weak cation exchange resin in all of Heikkila et al. Accordingly, it is not understood how one reading Heikkila et al. would use anything but a strong cation exchange resin. The Office Action has failed to consider Heikkila et al. in its entirety; thereby ignoring those portions of the reference that clearly teach the exclusive use of a strong cation exchange resin.

It is further contemplated that should the skilled artisan be inclined (for some inexplicable reason) to use a weak cation exchange resin as alleged by the Office Action in the process of Heikkila et al., it is respectfully submitted that he or she would not use said weak cation exchange resin in the first column. The Office Action has inferred that it would have been obvious to add further chromatographic columns to that

which is taught by Heikkila et al., said additional columns having different properties than the first column, with said different properties including varying ionic strength. It is respectfully submitted that when resins of different ion forms are used in chromatographic separation, the order of elution of the components varies. Accordingly, the use of a weak cation exchange resin in the method of Heikkila et al. as suggested by the Office Action would clearly not render similar results to the method of the present invention in which a weak cation exchange resin is employed in at least the first column.

Based on the comments set forth above, the rejection of claims 1-43 under 35 U.S.C. §103(a) be withdrawn.

It is further noted that applicants enclose a copy of **“Version With Markings to Show Changes Made”** indicative of the amendments being implemented herewith.

Finally, it is further submitted that all the claims in the application contain patentable subject matter and a Notice of Allowance is respectfully solicited.

Respectfully submitted,



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Enc. (Version with Markings to Show Changes Made)

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

1. (Amended) A method comprising a multistep process for recovering one or more products from a solution containing one or more components selected from the group consisting of betaine, erythritol, inositol, sucrose, mannitol, glycerol, amino acids and mixtures thereof by using chromatographic separation comprising at least one step, where a weak[ly] acid cation exchange resin is used for the chromatographic separation.
8. (Amended) The method of claim 1 wherein the chromatographic separation comprises at least one column or a part of a column, which contains a weak[ly] acid cation exchange resin.
9. (Amended) The method of claim 1 wherein the chromatographic separation comprises at least one column or a part of a column, which contains a strong[ly] acid cation exchange resin.
10. (Amended) The method of claim 1 wherein the weak[ly] acid cation exchange resin is an acrylic resin.
11. (Amended) The method of claim 10 wherein the acrylic resin is derived from the group consisting of methyl acrylate, ethyl acrylate, [buthyl] butyl acrylate, methyl methacrylate and acrylonitrile or acrylic acids or mixtures thereof.
12. (Amended) The method of claim 11 wherein the cation of said weak cation exchange resin is in the form selected from the group consisting of Na<sup>+</sup>, K<sup>+</sup>, H<sup>+</sup>, Mg<sup>2+</sup> and Ca<sup>2+</sup>.

13. (Amended) The method of claim 12 wherein the cation of said weak cation exchange resin is in Na<sup>+</sup> and/or K<sup>+</sup> form.
17. (Amended) The method of claim 1 comprising feeding the process solution to a first chromatographic column containing a weak[ly] acid cation exchange resin and then feeding a fraction from the first chromatographic column to a second chromatographic column containing a strong[ly] acid cation exchange resin.
18. (Amended) The method of claim 1 comprising feeding the process solution to a first chromatographic column containing a strong[ly] acid cation exchange resin and then feeding a fraction from the first chromatographic column to a second chromatographic column containing a weak[ly] acid cation exchange resin.
19. (Amended) The method of claim 18 comprising feeding a fraction from the second chromatographic column to a third chromatographic column containing weak[ly] acid cation exchange resin and feeding a fraction from the third chromatographic column to a fourth chromatographic column containing weak[ly] acid cation exchange resin.
20. (Amended) The method of claim 1 wherein a concentration or filtration unit is arranged between [the] chromatographic columns.
21. (Amended) The method of claim 17 wherein prior to feeding the fraction to [the next] a further chromatographic column said fraction is concentrated by evaporation.

22. (Amended) The method of claim 18 wherein, prior to feeding the fraction to [the next] a further chromatographic column said fraction is concentrated by evaporation.
23. (Amended) The method of claim 19 wherein, prior to feeding the fraction to [the next] a further chromatographic column said fraction is concentrated by evaporation.
24. (Amended) The method of claim 20 wherein, prior to feeding the fraction [to the next] from one chromatographic column to another, said fraction is concentrated by evaporation.
25. (Amended) The method of claim 1 [wherein the multistep process further comprises] further comprising one or more of the steps of crystallization, ion exchange or precipitation.
28. (Amended) The method of claim 1 wherein the particle size of the weak[ly] acid cation exchange resin is 10μm to 2000μm.
29. (Amended) The method of claim 28 wherein the particle size of the weak[ly] acid cation exchange resin is 100μm to 400μm.
30. (Amended) The method of claim 1 wherein a feed solution has a pH of from 6 to 11.
31. (Amended) The method of claim 30 wherein [the] a feed solution has a pH [of the feed solution is] of from 9 to 11.
36. (Amended) The method of claim 34 where weak[ly] acid cation exchange resin is used in at least one column.



37. (Amended) The method of claim 35 where weak[ly] acid cation exchange resin is used in at least [on] one column.
38. (Amended) The method of claim 34 where strong[ly] acid cation exchange resin is used in at least one column.
39. (Amended) The method of claim 35 where strong[ly] acid cation exchange resin is used in at least one column.